

GONOCOCCAL SALPINGITIS*

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An increase in the incidence of gonococcal salpingitis is a matter of great concern to the venereologist because it is an indication of failure to treat the primary infection early and effectively. This failure may arise from several factors—rapid spread of the infection, delay in the patient attending for treatment, delay in making the diagnosis, or failure of the therapeutic measures used.

Until the second half of the 19th century pelvic inflammatory disease was thought to be primarily an inflammation of the uterus; involvement of the adnexa seen at *post mortem* examination was considered to be purely a secondary manifestation of the disease.

Chronic pelvic inflammatory tumours unconnected with the puerperal state were described by Simpson (1843), who referred to the condition as "pelvic cellulitis". It was thought that this was due solely to inflammation occurring in the cellular tissue of the pelvis.

Virchow (1862), objecting to the term cellulitis, introduced "parametritis" or "perimetritis". Parametritis was thought to result from a variety of causes such as a blow or fall, excessive excitement, and the use of emmenagogues, aphrodisiacs, and abortifacents.

Although Morgagni (1769) had suggested the existence of blennorrhagic oöphoritis and Bernutz and Goupil (1867) had described 28 cases of gonococcal adnexitis, the suggestion that gonorrhoea could spread to the pelvis was not generally accepted until Noeggerath (1876) stated that women could develop acute or chronic gonorrhoeal perimetritis and that this was a common cause of sterility.

Westermarck (1886) was the first to demonstrate *N. gonorrhoeae* in tubal pus and Wertheim (1894) the first to demonstrate these organisms invading the tissues of the tube.

Curtis (1921) carried out an investigation into the bacteriology and pathology of the Fallopian tubes removed at operation. At this time acute tubal disease was usually treated by surgical measures and Curtis stated that gonorrhoea produced more surgical work than all other gynaecological conditions combined. The specimens obtained at operation in 192 cases were thoroughly ground and the material was inoculated into a variety of culture media. Cultures were positive in 38 cases, gonococci being isolated in nineteen. Secondary mixed infection was not often encountered.

Gonococci were found only in cases which showed macroscopic evidence of active inflammation at the time of operation and rarely in patients who had been free of pyrexia or leucocytosis for 14 days. Curtis deduced that gonococci lived only a short time in the tube. However, he described a case in which a patient was treated for leucorrhoea by curettage and had one tube removed at another hospital; 6 months later she developed an abdominal fistula communicating with the other tube and the latter was removed. Curtis obtained a pure growth of gonococci on culture. There was no intervening history of sexual contact. Another patient with a history extending over 2 years had a right pyosalpinx and a left hydrosalpinx with a cystic ovary. Both streptococci and gonococci were found in cultures.

Whether or not gonococci live only a few weeks in the tubes is not of great significance, because in the absence of treatment re-invasion from the cervix may occur particularly at the time of menstruation.

The introduction of the sulphonamide group of drugs, and later of penicillin, in the treatment of gonorrhoea led to a new assessment of this disease as a cause of serious morbidity in both males and females. It was generally acknowledged that the

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incidence of all complications had declined to a very low level following the use of these drugs.

Olin (1954), who reviewed 3,835 cases of gonorrhoea treated in Finland between 1924 and 1952, found that the incidence of salpingitis, prostatitis, epididymitis, and arthritis had all fallen dramatically with the use of penicillin therapy. The incidence of salpingitis was 2 per cent. with this form of treatment and with sulphonamides, compared with 14 per cent. in the pre-chemotherapeutic era. He drew the conclusion that "their frequency is so low that the disease has almost lost its social importance".

Hellerström (1943) reported a similar reduction in the frequency of complications in cases in Stockholm.

Nicol (1948), in a series of 229 cases, found salpingitis present at the time of diagnosis in 2.6 per cent. of cases and observed that after treatment it developed in 1.7 per cent.

In the early 1960s, however, some reports suggested that the picture of relative freedom from complications might be changing, at least with regard to salpingitis.

Dunlop (1961) found that salpingitis was present in 6 per cent. of 100 women with gonorrhoea who presented at the Whitechapel clinic in 1960.

Rees (1960), in an unpublished paper, reported an increase in the incidence of salpingitis between 1957 and 1959 in cases seen at the Liverpool Royal Infirmary clinic. The incidence of salpingitis present at the time of diagnosis rose from 3.3 per cent. in 1957 to 9.1 per cent. in 1959 and the incidence in cases developing after treatment rose from 1.1 per cent. in 1957 to 4 per cent. in 1959. This series contained a few cases in patients admitted to hospital in whom treatment had been started before specimens for bacteriological examination had been taken; they had been judged to be infected with gonorrhoea by the history of contact with known cases of gonorrhoea or by findings at laparotomy. The increased incidence coincided with the appearance in the area of strains of gonococci with decreased sensitivity to penicillin *in vitro*, and with cases of relapse following treatment which had previously been effective.

Gisslén, Hellgren, and Starck (1961) studied the frequency of complications in cases admitted to hospitals in Göteborg in Sweden in relation to the number of cases notified in the city. They found the incidence of arthritis and epididymitis to be extremely low, but salpingitis was found in 9.1 ± 1.2 per cent. of all women with gonorrhoea during the period 1950-1959. The incidence showed a slightly increasing trend, and for the period 1952-1959 it was 9.9 ± 1.2 per cent. The diagnosis was

based on the results of cultures. Gisslén and his colleagues stressed that the actual incidence must have been higher, as ambulant cases were excluded as were patients admitted to gynaecological and surgical wards in whom treatment had been begun before the diagnosis could be established. They concluded that, in view of the high incidence of gonorrhoea in the younger age groups and the frequency and seriousness of the complication of salpingitis, gonorrhoea could not be regarded as a simple unimportant public health problem.

In Liverpool the increased incidence of gonococcal salpingitis first observed in 1958 has continued. A review of 606 consecutive cases of gonorrhoea in patients attending the Liverpool Royal Infirmary clinic and examined by the same clinicians during the period 1963 to 1966 showed that 61 cases were complicated by salpingitis, an incidence of 10.6 per cent.

Pathology

Salpingitis, or, because the ovary is frequently involved, salpingo-oophoritis, may be gonococcal, tuberculous, or puerperal, or it may follow abortion, or be secondary to pelvic peritonitis often derived from infection from the alimentary tract. It has been suggested that some cases of salpingitis may have the same aetiology as abacterial urethritis in the male. Pleuro-pneumonia-like organisms (Lemke and Csonka, 1962) and *Chlamydia* (Dunlop, Freedman, Garland, Harper, Jones, Race, du Toit, and Treharne, 1967; Gordon, Harper, Quan, Treharne, Dwyer and Garland, 1969; Dunlop, Hare, Darougar, Jones and Rice, 1969) have both been suggested as possible pathogens. Experience at the Liverpool Royal Infirmary suggests that the incidence of "non-specific" salpingitis must be low. Contacts of men with non-gonococcal urethritis are seen by one of us (ER) at a special clinic held in the gynaecological department. The majority of these patients are the wives of men who have developed their urethritis after extramarital contact. Many of these women are referred only after the husband's treated infection has recurred on the resumption of marital coitus. In spite of this interval between presumed infection and examination, only one case of sub-acute salpingitis was diagnosed in 336 cases seen between 1959 and 1966. This patient was already taking tetracycline prescribed by her own doctor so that gonorrhoea could not be excluded. Unexpectedly, *N. gonorrhoeae* was cultured in seven cases; smears were positive in only one of these cases.

In the pre-chemotherapeutic era, Curtis (1921) estimated that 70 to 80 per cent. of cases were

gonococcal in origin. Novak and Novak (1956) stated that approximately 60 per cent. were gonococcal.

The mode of spread of gonococcal salpingitis is essentially different from that of the other types with the possible exception of "non-specific" salpingitis. Direct spread along the surface of the endometrium to the tubal mucosa takes place and gives rise to a bilateral endosalpingitis. A transient endometritis may occur but spontaneous resolution normally takes place owing to the monthly shedding of the endometrium. This explains the presence of extensive tubo-ovarian infection in association with a normal uterus. In puerperal salpingo-oöphoritis and in cases following abortion, the infection spreads through the uterine wall by the lymphatics and veins to the pelvic cellular tissue. This is essentially an exosalpingitis and the tubes are secondarily infected as they are in pelvic peritonitis. Even with gross involvement of the other layers of the tube, the mucosa may show little or no pathological change, and for this reason the prognosis regarding future pregnancy is far more favourable than in gonococcal salpingitis (Novak and Woodruff, 1967a). In the latter, primary destruction of the mucosa frequently leads to partial or complete occlusion and hence to sub-fertility, sterility, and ectopic pregnancy. Although purulent exudate may escape from the abdominal ostium and give rise to pelvic peritonitis and pelvic abscess, most frequently the abdominal ostium becomes obstructed, and this leads to the development of pyosalpinx and hydrosalpinx. In such cases there are relatively few adhesions on the outer aspect of the tube and ovary.

Gynaecologists are not agreed on the pathogenesis of hydrosalpinx. It is found without extensive adhesions, the walls are thin and translucent and lined by flattened epithelium, the fimbriae are inverted and there is complete closure of the abdominal orifice, the end of the tube being rounded and bulbous. Novak and Woodruff (1967b) suggested that it resulted from the liquefaction of pus in a pyosalpinx. Jeffcoate (1962) pointed out that in the latter there was gross destruction of the mucosa with thickening of the coats of the tube and stated that when a hydrosalpinx was found there was usually no history of previous severe pelvic inflammation. He suggested the possibility of ascending infection in childhood or adolescence. However, consideration of the histological structure of the tubes and the observations of Ries (1909) and Curtis (1921) on their pathology, together with the high incidence of sub-acute gonococcal salpingitis associated with relatively trivial symptoms, suggest that hydrosalpinx may result from attacks of sub-

acute gonococcal salpingitis which are frequently not diagnosed as such.

The epithelium of the Fallopian tube is of the simple columnar type, but is composed of two types of cells, the ciliated cells and the non-ciliated or so-called secretory cells (Fig. 1, overleaf).

The latter differ from the ciliated cells in the shape, size, and staining of the nuclei, the shape of the cell, and the staining of the cytoplasm. They undergo cytoplasmic and nuclear extrusion and for this reason are called "secretory" cells. There are no true secretory elements in the mucosa. The ciliated columnar cells are especially numerous in the fimbriae and ampulla (Bloom and Fawcett, 1962) (Fig. 2, overleaf).

It is possible that gonococci may find this type of columnar epithelium more congenial than the less stable epithelium concentrated in the rest of the tube. This would explain the observation of Case (1933) that, "although acute gonococcal infections nearly always extend along the entire tubal mucosa, in less virulent infections the gonococci are seen to localize in the fimbriated end, and the local lesions, with or without hydrosalpinx, pass entirely unobserved on clinical examination".

Ries (1909) confirmed and developed the observations and theories of Doran (1890), Kleinhans (1899), and Opitz (1904) on the mechanism of tubal occlusion. His hypothesis was that inflammation led to thickening of the serosa to form a ring, contraction of which impeded the escape of fluid from the tube with resulting dilatation. As the swelling subsided, further contraction of the peritonitic ring would take place and the fimbriae would be drawn inwards, giving an intussusception effect. Fusion of the peritoneum on the inside of the funnel with that on the serous surface of the fimbriae was then able to take place to give a firm scar. Complete inversion could occur by redistension of the tube followed by collapse (Fig. 3, overleaf).

Curtis (1921), reviewing 300 specimens removed at operation, found that several tubes with only slight changes confirmed the mechanism described by Ries.

It is possible that sub-acute gonococcal salpingitis, because of the frequent delay in diagnosis and treatment which may be due to the variety of relatively minor symptoms, may today present a more serious hazard to future fertility than acute salpingitis which now receives prompt antibiotic therapy with the patient at rest.

In recent years laparoscopy has provided some information about the pathological findings in acute salpingitis (Jacobson, 1964). The minimum criteria

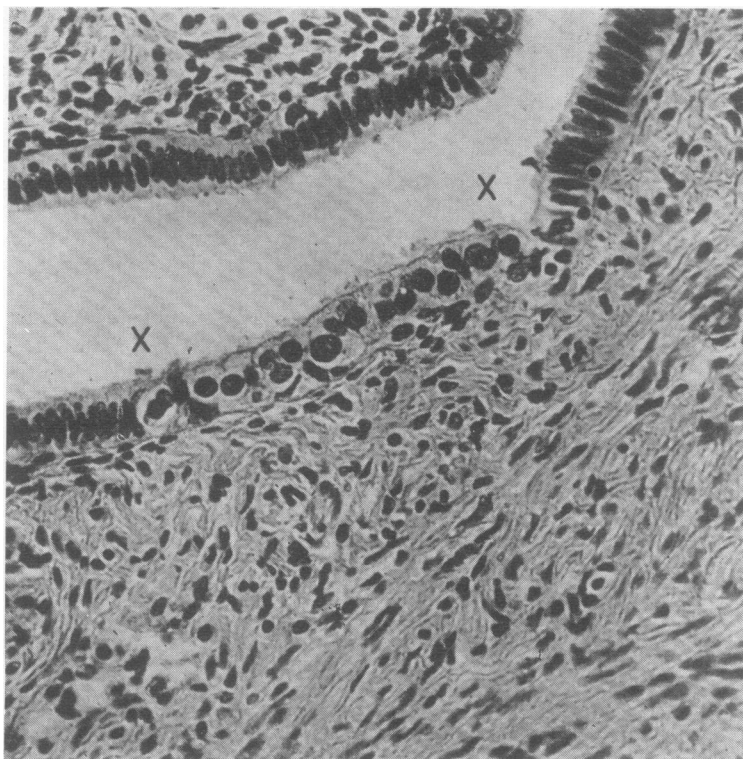


FIG. 1.—Tubal epithelium near isthmus, showing the frequently patchy distribution of the two chief cell types. The strip of epithelium between points marked X is ciliated, the remainder secretory. (Reproduced from Novak and Woodruff (1967c), by permission of the publishers.)

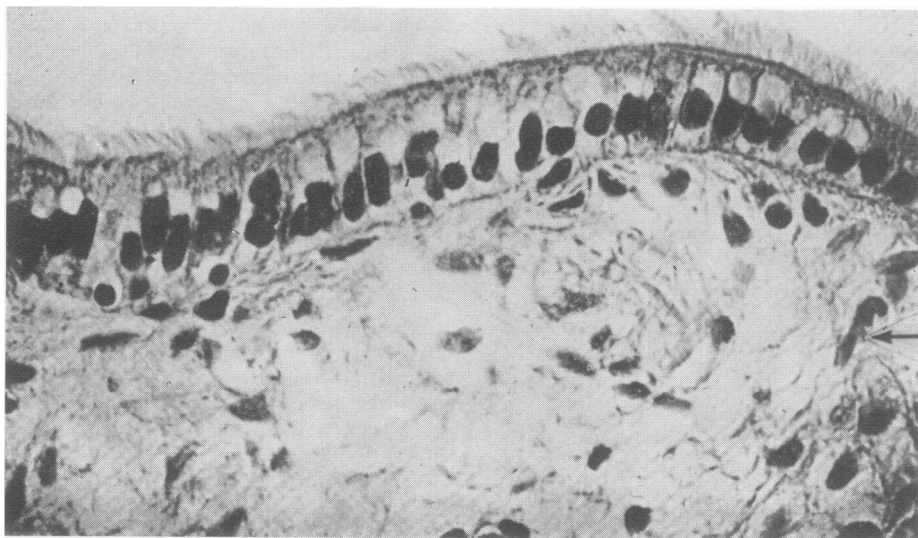


FIG. 2.—Ciliated epithelium on the fimbria ovarica, where this type is found almost exclusively. (Reproduced from Novak and Woodruff (1967c), by permission of the publishers.)

for laparoscopic diagnosis were pronounced reddening and oedema of the tubes. However, in two cases classified as normal on laparoscopic examination, the subsequent course was said to be such that the diagnosis of acute salpingitis could not be

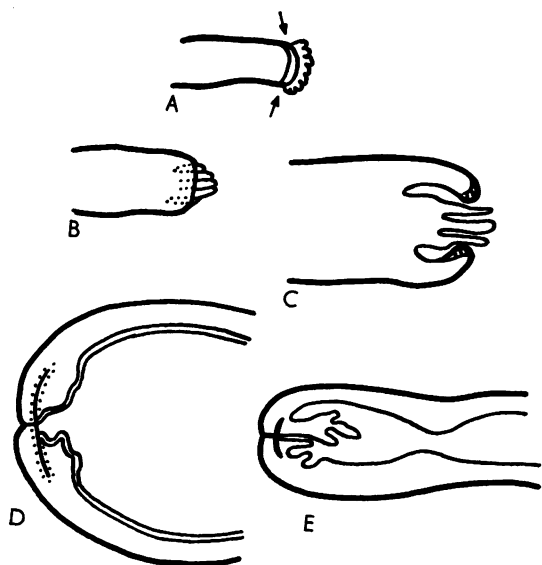


FIG. 3.—Mechanism of occlusion of the tube. Redrawn from Ries (1909).

reasonably doubted. In ten of the cases diagnosed as gonococcal salpingitis, the pelvic organs were found to be normal. Jacobson (1964) stated: "It must be stressed that the symptom-complex consisting of acute abdominal pain, fever, raised erythrocyte sedimentation rate, and *Neisseria* positive cultures from the vagina and cervix should not be unreservedly accepted as indicative of acute salpingitis". An alternative explanation is that the criteria are too strict for gonococcal salpingitis in which it could be expected that the majority of cases would have minor signs limited to the mucosa. In a few cases of gonococcal salpingitis Jacobson (1964) found "violin-string" adhesions between the peritoneum and the under surface of the liver as described by Curtis (1930). More often he found long tenuous adhesions in the pelvis in association with moderate inflammation of the tubes.

Clinical Features

It is usual to divide salpingitis into acute and chronic forms. A more appropriate classification for gonococcal salpingitis would be early and late or

chronic, the early cases being subdivided into acute and sub-acute. Modern therapeutic measures can eliminate gonococci from the genital tract, but grossly damaged tissue cannot be restored to normal function and the symptoms of long-standing or chronic salpingitis are due to the sequelae of the primary infection such as pyosalpinx, tubo-ovarian abscess, cystic ovary, or adhesions. However, acute or sub-acute symptoms may be superimposed when a fresh infection is acquired and a change or exacerbation of symptoms should lead to a search for gonococci in the lower genital tract.

It is the sub-acute case which is most frequently seen in the venereal diseases clinic; the acute case usually requires an emergency admission to a gynaecological or surgical ward. The acute symptoms, essentially those of a localized or generalized pelvic peritonitis, are not features of the sub-acute case. With the latter the patient may complain of discomfort, heaviness, a "bearing-down" feeling, aching or dull pain in both groins or across "the bottom of the stomach", pain in the right or left side, or backache. It is not uncommon for patients who are attending as contacts to admit to no symptoms initially, but later in the history-taking, on being questioned about their menstrual cycle, they may volunteer the fact that they have had "terrible pains" since the end of their last period. Frequently they do not complain of discharge. Urinary symptoms may be associated.

On abdominal examination there may be guarding and deep tenderness in one or both iliac fossae. Vaginal examination reveals tenderness in both fornices even when the complaint is only of unilateral abdominal pain. The tenderness is often more marked on one side and varies from slight to severe. Gentle rocking of the cervix causes pain by putting the broad ligament on the stretch on alternate sides. Unless there is a previous history of salpingitis there is usually no palpable swelling of the tubes in early cases although it may be an obvious feature when there has been a delay in diagnosis. The temperature may be normal but is more often elevated to around 99°F. The erythrocyte sedimentation rate is usually raised.

That sub-acute cases are not always the early stages of an acute infection is demonstrated by the duration of symptoms in many cases.

In this series one patient had a history of lower abdominal pain for 8 weeks, the onset being one week after parturition. She had been discharged from a maternity unit 48 hours after the birth of her third child and a day or two later the baby had developed a sticky eye. This was treated by the family doctor with penicillin eye drops thrice daily and subsequently with penicillin eye ointment. At no time was there acute inflammation

or oedema of the lids but a slight discharge persisted, and the mother, becoming dissatisfied, took the baby, then aged 9 weeks, to the Children's Hospital where *N. gonorrhoeae* was cultured from the discharge.

The mother was then examined. Mucopus was expressed from one Bartholin's duct and there were bilateral tender appendage swellings approximately 1½ inches in diameter. Gonococci were found in smears and cultures in the urethral, Bartholin's duct, and cervical specimens.

Throughout the 8 weeks the patient had cared for her other two children and although attending her doctor with the baby was neither examined nor treated, presumably because she had not complained greatly. She was a reasonably intelligent woman and had attributed her discomfort to "after-pains". She had no previous history of gonorrhoea or pelvic inflammation.

Some patients do attend their own doctor complaining of these minor symptoms and are treated for cystitis. The present widespread use of urinary antiseptics in the treatment of cystitis has resulted in some cases reaching the clinic, although occasionally after a delay of several weeks, owing to the failure of the symptoms to respond. Previously, the use of antibiotics had some symptomatic effect although they were not always curative in the dosage used.

Pain may subside completely with rest in bed. This has been seen in a patient admitted to hospital over the weekend for observation for possible appendicitis or salpingitis. On pelvic examination 48 hours later, bilateral tenderness of the tubes was found, although the patient was then symptom-free; gonococci were cultured from the cervix.

The great variation in symptomatology can be explained by considering the probable variety of tissue response in the tubes together with the two components of pain experienced in salpingitis.

The tissue response to the gonococcus in the lower genital tract in women ranges from the macroscopically normal to acute inflammation with purulent exudate. That this is to some extent paralleled in the tubes was found by Curtis (1921). The sensation of pain due to disturbance in hollow organs is thought to result from distension (Sweet, 1959). It is carried by the autonomic nervous system. The effective stimulus may be inflammation or violent or irregular peristaltic contractions. The pain experienced is diffuse and deep-seated and cannot be accurately localized. The parietal peritoneum and the base of the mesenteries are innervated by the somatic nervous system and when an inflammatory process spreads to these areas the

sensory somatic nerve endings are stimulated and pain is experienced in the surface area supplied by the affected nerve. This is clearly demonstrated in acute appendicitis, in which early sub-acute periumbilical pain (the gut is developmentally a mid-line structure) changes to acute pain in the right iliac fossa. The pelvic parietal peritoneum, being deep-seated and well-protected, is less sensitive than the abdominal peritoneum and the localizing pain is less precisely identified and much less severe than that experienced in a similar pathological process in the abdomen (Dundee, 1967).

Thus a complaint of unilateral pain in a patient with bilateral tenderness of the tubes on palpation may be due to localized unilateral involvement of parietal peritoneum. It explains why a recent patient, who had a laparotomy for ectopic pregnancy and who at operation was found to have bilateral salpingitis with pus visible at both fimbriated ends, had complained only of severe localized left-sided pain. On being closely questioned immediately after the operation she admitted to some hypogastric discomfort but no right-sided pain. *N. gonorrhoeae* was cultured from the tubal pus.

Passive distension of the intestine is a painless condition as seen in adynamic ileus. Hydrosalpinx is similarly painless, although, as has been suggested, it may follow a relatively mild inflammatory process involving the fimbriated end of the tube.

It is interesting to find that Astruc (1762), writing on lymphous fluor albus (the differentiation of which from gonorrhoeal discharge he considered to be "most problematical"), said that it occurred "in the women in whom the uterus is too often thrown into a state of contraction by lascivious ticklings or by excess of prostitution". He observed that "The fluor albus, the least capable of irritating in the beginning, injures at length the internal surface of the uterus". He also stated that "Though inflammation of the uterus may be always of the same general nature and is commonly attended by the same symptoms, there may, nevertheless, be distinguished some difference, 1. With relation to the degree of the disease. Thus the inflammation of which the accidents are slight; that is to say, which causes only swelling, tension, heat, and a moderate degree of pain; and cases without, or with but little, fever; bears only the name of phlogosis. While, on the contrary, the name of phlegmon, or inflammation simple, is given when accidents are more considerable and the fever is more acute".

It seems probable that he was recognizing as phlegmon and phlogosis, acute and sub-acute gonococcal salpingitis.

Review of Cases

606 consecutive cases of gonorrhoea were examined between 1963 and 1966; of these 61 (10.6 per cent.) were complicated by salpingitis.

54 cases of salpingitis presented at the clinic, six were seen in gynaecological or surgical wards, and one in the casualty ward.

All out-patients were advised to enter hospital, but in 27 of the 43 sub-acute cases the patients refused for family or social reasons and were treated as out-patients. Two patients were treated by the family doctor. Table I shows the disposal of the 61 cases.

TABLE I
DISPOSAL OF CASES

Diagnosis	Total Number	Admitted to Hospital	Out-Patients	General Practitioner
Acute	18	16	1	1
Sub-acute	43	15	27	1
Total	61	31	28	2

History 25 patients (41 per cent.) had had previous attacks of gonorrhoea and eleven (18 per cent.) previous attacks of salpingitis. Abdominal operations for pelvic infection were recorded in four patients:

- (1) Laparotomy 5 years earlier at the age of 16 years. Salpingitis diagnosed. Left salpingectomy 1 year earlier.
- (2) "Abscess of womb" 5 years earlier at age 22 years.
- (3) Abscess of tube at age 20 years.
- (4) Laparotomy 14 weeks earlier at age 17 years. Acute salpingitis diagnosed.

Clinical Signs All patients had bilateral tenderness of the tubes or generalized pelvic tenderness. In many sub-acute cases tenderness was more marked on one side. Other findings were as follows:

- Tender bilateral appendage swellings (4)
- Tender unilateral appendage swelling (4)
- Tender thickened tubes (9)

Diagnosis Salpingitis was diagnosed at the time of the first examination in 44 cases. The duration of the pain in this group ranged between 8 hrs and 10 weeks, and exceeded 3 weeks in ten cases (23.2 per cent.) (Table II). In patients with a history of recurrent attacks of pain, only the duration of the presenting attack is recorded. One patient complained only of dyspareunia. Four cases developed after the first examination and before treatment because of delay in establishing the diagnosis; in three of these cultures were positive only in the second set of genital tests and further delay occurred when patients failed to return when requested (Table III). Thirteen cases developed after treatment. The majority of these were of treatment failure, gonococci persisting in the lower genital tract.

TABLE II
DURATION OF PAIN AT TIME OF FIRST ATTENDANCE
IN 43 PATIENTS

Time (wks)	No. of Cases
< 1	18
1-2	8
2-3	7
3-4	3
4-8	5
8-10	2
Total	43

Ten cases were in wives referred as secondary contacts by their husbands. None of these had had previous attacks of salpingitis but four had had previous attacks of gonorrhoea.

The age range was 16-37 years.

Pyrexia The majority were pyrexial (Table IV, overleaf). The absence of pyrexia does not necessarily indicate that the pathological process is trivial.

One patient aged 21 years, referred from the gynaecological unit, had been admitted with an exacerbation of lower abdominal pain for which she had been treated intermittently by her own doctor for 10 months. She had bilateral tender appendage swellings and was apyrexial.

TABLE III
TIME OF ONSET OF PAIN IN FOUR CASES DEVELOPING BEFORE TREATMENT

Case Number	Days after First Attendance	Smears	Cultures
1	2	Negative	Positive (1st)
2	4	Negative	Positive (2nd)
3	10	Negative	Positive (2nd)
4	14	Negative	Positive (2nd)

TABLE IV
TEMPERATURE RANGE

Temperature (°F.)	Number of Cases
98.4 and below	13
98.6-98.8	7
99-99.8	18
100-100.8	9
101	4
102	1
Not recorded	9
Total	61

However, the erythrocyte sedimentation rate was 44 mm./1st hour (Westergren) and the white cell count 13,000 per cmm. The diagnosis was salpingitis, possibly tuberculous, but she was referred for an opinion. There was a small cyst of one Bartholin's gland, but no other signs suggesting gonorrhoea. Urethral and cervical smears were negative for gonococci, but the latter were grown in culture from both sites. The strain isolated exhibited decreased sensitivity to penicillin (minimum inhibitory concentration 0.125 unit/ml.). The symptoms subsided completely with treatment.

Onset As first observed by Ricord (1853; see also Ricci, 1945) the onset of salpingitis most commonly occurs during or shortly after menstruation. In this series 66 per cent. of patients developed pain within a week of menstruation (Fig. 4).

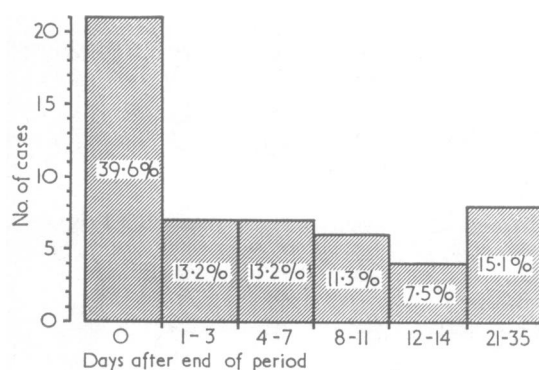


FIG. 4.—Relationship of onset of pain to menstrual period in 53 patients.

The relationship could not be ascertained in eight patients for the following reasons:

- (1) Post-partum 9 weeks; pain 8 weeks
- (2) Post-partum 8 weeks; pain 3 weeks
- (3) Intermittent bleeding 6 weeks; pain 2 weeks
- (4) Intermittent bleeding 4 weeks; pain 4 weeks
- (5) Dyspareunia only
- (6) } Date of last period not recorded
- (7) }
- (8) }

Cultures The importance of cultural methods in diagnosis is demonstrated by the fact that cultures were positive in 98.5 per cent. of cases and were responsible for the diagnosis in 52.4 per cent. Cultures were negative in one case (Fig. 5).

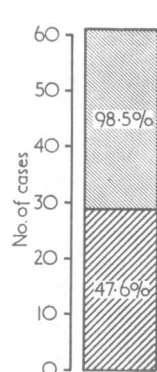


FIG. 5.—Bacteriological results in 61 cases.

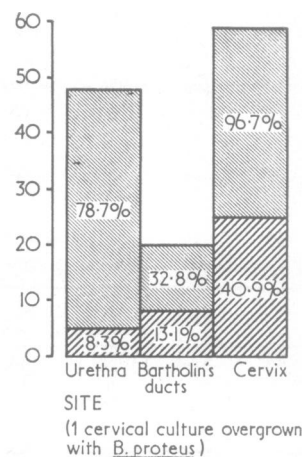


FIG. 6.—Sites of positive tests in 61 cases.

The sites of infection are shown in Fig. 6. Gonococci were found in the cervix in all cases. Two were positive only in the cervical smear, one cervical culture being overgrown with *B. proteus* and one negative. By comparison, in cases not complicated by salpingitis during the period 1963-1966, gonococci were found only in the urethra or Bartholin's ducts in 6 per cent.

In three cases the smears were positive only in Bartholin's ducts although cultures were subsequently reported positive in the urethra and cervix. In a case in which the differential diagnosis is difficult such a finding is of great value.

Only the cultures at the second set of genital tests were positive in three cases, all smears being negative.

Gonococci were isolated from Bartholin's duct specimens in 21 cases, clinical signs of infection being present in fifteen (Table V, opposite). In the three cases in which no secretion was expressed a lacrimal probe was introduced into the duct and the culture plate was inoculated by the probe. Contamination of the specimens by gonococci present on the labia cannot be excluded in these cases.

The sensitivity to penicillin of the strains isolated was measured in 59 cases. One strain failed to grow on sub-culture. The tube dilution method was

TABLE V

CLINICAL SIGNS IN BARTHOLIN'S DUCTS IN 21 CASES IN WHICH GONOCOCCI WERE ISOLATED FROM DUCT SPECIMENS

Clinical Findings	Number of Cases
Mucopus or mucoid discharge expressed	13
Clear or cloudy mucus expressed	5
Nil expressed, both palpable	1
Nil expressed, both much enlarged and tender	1
No clinical signs	1
Total	21

used until May, 1964; thereafter the tablet diffusion method on 7 per cent. chocolate agar was used after a 6 months period during which both methods, after standardization, were used in parallel with very close correlation. The incidence of strains exhibiting decreased sensitivity to penicillin was higher in those cases which developed salpingitis (42 per cent.) than the overall incidence for 1963-1966 which was 32 per cent. (Table VI). It was thought that this was not due to a bacterial factor but to added delay in achieving cure of the primary infection due to failure of the standard method of treatment. Such failure was demonstrated by the persistence of gonococci in the secretions of those patients treated in the clinic, and by failure of penicillin treatment given for a variety of conditions in undiagnosed cases of gonorrhoea outside the clinic.

Treatment Standard treatment of uncomplicated cases was procaine penicillin with aluminium monostearate 600,000 units in 1963 and fortified procaine penicillin 800,000 units subsequently. In 1966 alternative or additional treatment was given to all cases from whom relatively insensitive strains were isolated. This was given 3 days after the patient's first attendance on her return for culture results or first post-treatment tests when the sensitivity results were available. Previously further treatment had been delayed until the post-treatment tests were reported as positive. The alternative or additional treatment during this period was ampicillin 1 g. or tetracycline hydrochloride 500 mg. 6 hrly for 4 days, the latter being considered preferable if the patient was menstruating. The effect

of this approach was to reduce the proportion of post-treatment to pre-treatment salpingitis from 1:3.5 in 1963-1965 to 1:8 in 1966, although the general incidence of salpingitis was higher in 1966 as was the incidence of strains of gonococci relatively insensitive to penicillin (Tables VII and VIII, overleaf). The actual incidence of post-treatment salpingitis for 1966 was, therefore, 1.5 per cent. (three cases in 195 cases treated). This is comparable with the incidence of 1.7 per cent. reported by Nicol (1948) and 1.1 per cent. reported by Rees for 1957, both these reports relating to a period in which the incidence of salpingitis was low.

No case of salpingitis developed after initial treatment with tetracycline. Two cases occurred after treatment with ampicillin. At this clinic only one strain of gonococcus showing slight resistance to tetracycline has been isolated during the past 6 years. At the present time, tetracycline can, therefore, be given with confidence to women at particular risk, that is, those who are menstruating and known to be harbouring strains of gonococci relatively insensitive to penicillin.

Tetracycline in one oral dose has been given as standard treatment of gonorrhoea in some centres, but it is felt that this use of a bacteriostatic antibiotic is likely to lead to the development of resistance to tetracycline and a 4-day course is always prescribed when this form of therapy is used for the treatment of uncomplicated gonorrhoea.

Larger doses of procaine penicillin are now generally used as standard treatment and give higher cure rates than those previously given by penicillin alone.

Summary and Conclusions

606 consecutive cases of gonorrhoea in the female were reviewed; 61 cases (10.6 per cent.) were complicated by salpingitis.

The pathology and symptomatology of gonococcal salpingitis are discussed and related to modern concepts of the experience of pain sensation arising from the pelvis.

The pathogenesis of hydrosalpinx has been considered. It is suggested that hydrosalpinx commonly

TABLE VI
SENSITIVITY OF STRAINS ISOLATED, 1963 TO 1966

M.I.C. u./ml. Penicillin	0.05	0.25	0.125	0.06	0.03	0.015	0.008	Total
No. of Cases	0	14	11	11	10	10	3	59
	25 (42%)							

TABLE VII

INCIDENCE OF PRE- AND POST-TREATMENT SALPINGITIS AND OF RELATIVELY INSENSITIVE STRAINS OF GONOCOCCI

Year	No. of Cases of Gonorrhoea	Total Cases of Salpingitis		Post-treatment Salpingitis		Minimum Inhibitory Concentration 0.5-0.125 u./ml.		
		No.	Per cent.	No.	Per cent.	Overall Per cent.	Salpingitis	
							No.	Per cent.
1963-1965	411	35	8.5	10	2.4	30.6	17	48.5
1966	195	24	12.3	3	1.5	37.7	8	33.3
Total	606	59		13			25	

TABLE VIII

SENSITIVITY OF STRAINS ISOLATED IN 13 CASES OF SALPINGITIS DEVELOPING AFTER TREATMENT, 1963-1965 AND 1966

Year	Number of Cases	Minimum Inhibitory Concentration (units penicillin/ml.)						
		0.5	0.25	0.125	0.06	0.03	0.015	0.008
1963-1965	10	0	3	5	1	1	0	0
1966	3				2		1	
Total	13	0	3	5	3	1	1	0

results from attacks of sub-acute gonococcal salpingitis.

The importance of the early recognition and adequate treatment of sub-acute salpingitis is stressed in view of the possible development of sub-fertility and sterility.

It is suggested that the increased incidence of salpingitis is due to failure of treatment methods which had previously proved successful before the emergence of strains of gonococci exhibiting decreased sensitivity to penicillin. Antibiotic treatment given for a variety of conditions outside the venereal diseases clinics previously cured incidentally many cases of gonorrhoea. The increased use of sulphonamides and urinary antiseptics in the treatment of presumed urinary infections is an additional factor in failure to cure undiagnosed cases of gonorrhoea which subsequently present at clinics.

Gonococcal salpingitis is a serious hazard to the mental and physical health of women because of its effect on fertility and because of the chronic ill-health which may result from the sequelae of pelvic inflammatory disease. Education of the public should stress the increased incidence of salpingitis and clearly explain the potential risk to future health in the female. This should be contrasted with

the much smaller risk in the male who, at present, tends to influence his consort regarding the supposed innocuousness of the disease.

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Salpingite gonococcique

RÉSUMÉ

606 cas consécutifs de gonococcie féminine furent passés en revue; 61 cas (10,6 pour cent) étaient compliqués de salpingite.

Les signes et symptômes de la salpingite gonococcique sont discutés et rapportés aux conceptions modernes concernant les douleurs de la région pelvienne.

La pathogénie de l'hydrosalpinx a été considérée. Il est suggéré que l'hydrosalpinx est habituellement le résultat de crises de salpingite subaiguë gonococcique.

L'importance du diagnostic précoce et du traitement approprié de la salpingite subaiguë est soulignée en fonction de la possibilité du développement d'hypofertilité et de stérilité.

Il est suggéré que l'augmentation de l'incidence des salpingites est due à l'échec de méthodes thérapeutiques qui se montraient efficaces avant l'apparition de souches de gonocoques moins sensibles à la pénicilline. Auparavant, un traitement par l'antibiotique, prescrit hors des dispensaires anti-vénériens dans des indications variées, guérissaient, à l'occasion, de nombreux cas de gonococcie. L'augmentation de l'emploi des sulfamides et des antiseptiques urinaires dans le traitement d'infections urinaires présumées est un facteur supplémentaire de non guérison de cas de gonococcie non diagnostiqués qui se présentent ensuite dans les dispensaires.

La salpingite gonococcique représente un risque sérieux pour la santé mentale et physique des femmes du fait de son effet sur la fertilité et du fait de l'état d'indisposition chronique entraîné par les suites d'un état inflammatoire pelvien. L'éducation du public doit insister sur l'augmentation de l'incidence de la salpingite et expliquer clairement la menace que ceci représente pour la santé future de la femme. Ceci s'oppose au risque, beaucoup moindre, couru par l'homme qui, actuellement, a tendance à influencer sa partenaire quant à l'innocuité supposée de la maladie.